Strongylocentrotus droebachiensis (Green Sea Urchin)

Priority 2 Species of Greatest Conservation Need (SGCN)

Class: *Echinoidea* (Sea Urchins)
Order: *Camarodonta* (Sea Urchins)
Family: *Strongylocentrotidae* (Sea Urchins)

General comments:

General information:
http://www.maine.gov/dmr/rm/seaurchin/research.htm

No Species Conservation Range Maps Available for Green Sea Urchin

SGCN Priority Ranking - Designation Criteria:

Risk of Extirpation: NA
State Special Concern or NMFS Species of Concern: NA
Recent Significant Declines:

Green Sea Urchin is currently undergoing steep population declines, which has already led to, or if unchecked is likely to lead to, local extinction and/or range contraction.
Notes:
recent decline:
Chen and Hunter, 2003: http://www.sciencedirect.com/science/article/pii/S0165783602000826

Steneck et al

Regional Endemic: NA
High Regional Conservation Priority: NA
High Climate Change Vulnerability:

Strongylocentrotus droebachiensis is highly vulnerable to climate change.

Understudied rare taxa: NA
Historical: NA
Culturally Significant: NA

Habitats Assigned to Green Sea Urchin:

Formation Name **Intertidal**

Macrogroup Name **Intertidal Bedrock**

Habitat System Name: Low-Intertidal ****Primary Habitat**** **Notes:** *spawning, adult feeding habitat, juvenile feeding habitat*

Macrogroup Name **Intertidal Gravel Shore**

Habitat System Name: Lower Intertidal ****Primary Habitat**** **Notes:** *spawning, adult feeding habitat, juvenile feeding habitat*

Formation Name **Subtidal**

Macrogroup Name **Subtidal Bedrock Bottom**

Habitat System Name: Bedrock ****Primary Habitat**** **Notes:** *over-wintering habitat, spawning, adult feeding habitat, juvenile feeding habitat*

Habitat System Name: Erect Epifauna ****Primary Habitat**** **Notes:** *spawning, juvenile and adult feeding, over-wintering*

Habitat System Name: Kelp Bed ****Primary Habitat**** **Notes:** *over-wintering habitat, spawning, adult feeding habitat, juvenile feeding habitat*

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Formation Name **Subtidal**

Macrogroup Name **Subtidal Coarse Gravel Bottom**

Habitat System Name: Coarse Gravel ****Primary Habitat**** **Notes:** *over-wintering habitat, spawning, adult feeding habitat, juvenile feeding habitat*

Habitat System Name: Erect Epifauna ****Primary Habitat**** **Notes:** *spawning, juvenile and adult feeding, over-wintering*

Habitat System Name: Kelp Bed ****Primary Habitat**** **Notes:** *over-wintering habitat, spawning, adult feeding habitat, juvenile feeding habitat*

Macrogroup Name **Subtidal Pelagic (Water Column)**

Habitat System Name: Nearshore **Notes:** *larval development and dispersal*

Habitat System Name: Offshore **Notes:** *larval development and dispersal*

Stressors Assigned to Green Sea Urchin:

Stressor Priority Level based on Severity and Actionability

	Moderate Severity	High Severity
Highly Actionable	Medium-High	High
Moderately Actionable	Medium	Medium-High
Actionable with Difficulty	Low	Low

IUCN Level 1 Threat **Biological Resource Use**

IUCN Level 2 Threat: Fishing and Harvesting of Aquatic Resources

Severity: Severe **Actionability:** Moderately actionable

Notes: Maine's sea urchin stock has been significantly over-fished. The threat of over-fishing is highly certain and highly likely (occurred in recent years). However, reductions in fishing pressure have only been effective in stabilizing or recovering the stock in some regions. Other regions are showing no signs of recovery despite no fishing in more than 10 years. Other actions, such as reseeding, hold promise but will be difficult to implement.

IUCN Level 1 Threat **Pollution**

IUCN Level 2 Threat: Agricultural and Forestry Effluents

Severity: Severe **Actionability:** Moderately actionable

Notes: Echinoderm larvae are exceptionally sensitive to excessive nutrients, toxic chemicals (including pesticides and chemical therapeutants), and/or sediments. Adults are sensitive, but comparatively to larvae, less effected.

IUCN Level 2 Threat: Domestic and Urban Waste Water

Severity: Severe **Actionability:** Moderately actionable

Notes: Echinoderm larvae are exceptionally sensitive to excessive nutrients, toxic chemicals (including pesticides and chemical therapeutants), and/or sediments. Adults are sensitive, but comparatively to larvae, less effected.

IUCN Level 2 Threat: Industrial and Military Effluents

Severity: Severe **Actionability:** Moderately actionable

Notes: Oil spills are toxic to species with intertidal distributions. Local scale spills have an unpredictable likelihood and actionability is moderate and influenced by response time to spills.

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IUCN Level 1 Threat **Climate Change and Severe Weather**

IUCN Level 2 Threat: Habitat Shifting or Alteration

Severity: Moderate Severity **Actionability:** Actionable with difficulty

Notes: The impacts of increasing ocean acidification on sea urchins is poorly understood (low certainty), but the effects of the threat are likely to occur, statewide (pervasively), given that sea urchins have a calcareous shell and spines and larvae have a calcareous skeleton.

IUCN Level 2 Threat: Temperature Extremes

Severity: Moderate Severity **Actionability:** Actionable with difficulty

Notes: Increased water temperatures have interactive effects with ocean pH decreasing suvivorship of larvae and growth rate of echinoderms. Likelihood is high (high certainty) and large scale. The ability to mitigate sea temperature change is low.

IUCN Level 1 Threat **Invasive and Other Problematic Species, Genes and Diseases**

IUCN Level 2 Threat: Invasive Non-native-Alien Species-Diseases

Severity: Moderate Severity **Actionability:** Actionable with difficulty

Notes: Invasive algae (Codium fragile) and tunicates (Didemnum sp) have colonized sea urchin habitat in some regions. This threat is poorly understood (low certainty), but the threat and its effects are likely to occur in some areas (patchy spatially).

IUCN Level 2 Threat: Problematic Native Species-Diseases

Severity: Moderate Severity **Actionability:** Actionable with difficulty

Notes: It is possible (low certainty) that increasing temperatures in the Gulf of Maine will result in increasing incidence of disease, such as parasitic Paramoeba infestations that have plagued Nova Scotia, where water temperatures are generally warmer than the Gulf of Maine.

Species Level Conservation Actions Assigned to Green Sea Urchin:

Only species specific conservation actions that address high (red) or medium-high (orange) priority stressors are summarized here.

Conservation Action **Category:** Survey and Monitoring **Biological Priority:** critical **Type:** on-going

Monitor stock status through surveys and sampling programs

Stressor(s) Addressed By This Conservation Action

Fishing and Harvesting of Aquatic Resources

Conservation Action **Category:** Research **Biological Priority:** high **Type:** on-going

Conduct research to support stock assessment and population dynamics modeling

Stressor(s) Addressed By This Conservation Action

Fishing and Harvesting of Aquatic Resources

Conservation Action **Category:** Research **Biological Priority:** high **Type:** new

Determine the relative roles of natural predation, fishing mortality, and climate change in stock dynamics

Stressor(s) Addressed By This Conservation Action

Fishing and Harvesting of Aquatic Resources

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Conservation Action **Category:** Public Outreach **Biological Priority:** high **Type:** on-going
Design and encourage the use of more size-selective fishing gear
Stressor(s) Addressed By This Conservation Action
Fishing and Harvesting of Aquatic Resources

Conservation Action **Category:** Species Management **Biological Priority:** high **Type:** on-going
Support community engagement in developing a fisheries management plan
Stressor(s) Addressed By This Conservation Action
Fishing and Harvesting of Aquatic Resources

Conservation Action **Category:** Research **Biological Priority:** high **Type:** new
Assess the feasibility and advantages of local or area species management approaches
Stressor(s) Addressed By This Conservation Action
Fishing and Harvesting of Aquatic Resources

Conservation Action **Category:** Research **Biological Priority:** moderate **Type:** new
Determine the feasibility of reseeding programs
Stressor(s) Addressed By This Conservation Action
Fishing and Harvesting of Aquatic Resources

Conservation Actions Associated with the Echinoderms Guild:

Conservation Action **Category:** Research **Biological Priority:** high **Type:** on-going
Expand existing education and research among researchers and managers to improve understanding and management ability
Stressor(s) Addressed By This Conservation Action
Domestic and Urban Waste Water

Conservation Action **Category:** Policy **Biological Priority:** critical **Type:** on-going
Through education and collaboration, reduce the use of antifouling agents and biocides that negatively affect SGCN, and investigate alternative biofouling agents.
Stressor(s) Addressed By This Conservation Action
Marine and Freshwater Aquaculture

Conservation Action **Category:** Public Outreach **Biological Priority:** high **Type:** on-going
Encourage the use of more targeted fishing gear in order to reduce bycatch and habitat disturbance
Stressor(s) Addressed By This Conservation Action
Fishing and Harvesting of Aquatic Resources

Conservation Action **Category:** Research **Biological Priority:** high **Type:** new
Investigate the effect of various harvesting practices on the integrity of habitats and trophic and ecological systems
Stressor(s) Addressed By This Conservation Action
Fishing and Harvesting of Aquatic Resources

Conservation Action **Category:** Survey and Monitoring **Biological Priority:** high **Type:** on-going
Ground-truth mapped habitat and compare to historical maps to monitor change over time, may require updating mapping plans to map more frequently
Stressor(s) Addressed By This Conservation Action
Fishing and Harvesting of Aquatic Resources

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Conservation Action **Category:** Research **Biological Priority:** high **Type:** on-going

Conduct research to support management, including but not limited to stock assessments, population genetics, population monitoring, etc.

Stressor(s) Addressed By This Conservation Action

Fishing and Harvesting of Aquatic Resources

Conservation Action **Category:** Public Outreach **Biological Priority:** high **Type:** on-going

Encourage the use of more targeted fishing gear in order to reduce bycatch and habitat disturbance

Stressor(s) Addressed By This Conservation Action

Fishing and Harvesting of Aquatic Resources

Conservation Action **Category:** Research **Biological Priority:** high **Type:** new

Research to understand how effects such as habitat modifications, population changes, and pollution can influence SGCN

Stressor(s) Addressed By This Conservation Action

Habitat Shifting or Alteration

Conservation Action **Category:** Research **Biological Priority:** high **Type:** new

Identify species that are resilient to ocean acidification (OA) and rises in sea surface temperature (SST).

Stressor(s) Addressed By This Conservation Action

Habitat Shifting or Alteration

Broad Taxonomic Group Conservation Actions:

Additional relevant conservation actions for this species are assigned within broader taxonomic groups in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-1.

Habitat Based Conservation Actions:

Additional conservation actions that may benefit habitat(s) associated with this species can be found in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-15. Click on the Habitat Grouping of interest to launch a habitat based report summarizing relevant conservation actions and associated SGCN.

The Wildlife Action Plan was developed through a lengthy participatory process with state agencies, targeted conservation partners, and the general public. The Plan is non-regulatory. The species, stressors, and voluntary conservation actions identified in the Plan complement, but do not replace, existing work programs and priorities by state agencies and partners.